μA709B

HIGH PERFORMANCE OPERATIONAL AMPLIFIER

FAIRCHILD LINEAR INTEGRATED CIRCUITS

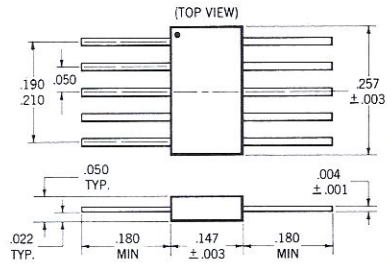
GENERAL DESCRIPTION — The μA709B is a high-gain operational amplifier constructed on a single silicon chip using the Fairchild Planar* epitaxial process. It features low offset, high input impedance, large input common mode range, high output swing under load and low power consumption. The device displays exceptional temperature stability and will operate over a wide range of supply voltages with little degradation of performance. The amplifier is intended for use in DC servo systems, high impedance analog computers, in low-level instrumentation applications and for the generation of special linear and nonlinear transfer functions. For improved specifications, see μA709A or μA709 data sheet.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V
Internal Power Dissipation (Note 1)	250 mW
Differential Input Voltage	±5.0 V
Input Voltage	±10 V
Output Short-Circuit Duration ($T_A = 25°C$)	5 sec
Storage Temperature Range	−65°C to +150°C
Operating Temperature Range	−55°C to +125°C
Lead Temperature (Soldering, 60 second time limit)	300°C

PHYSICAL DIMENSIONS

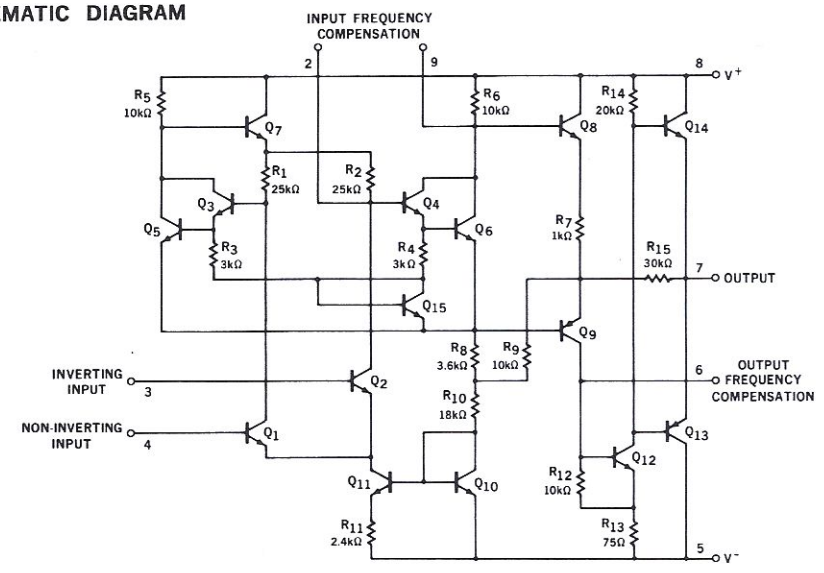
(TYPICAL FLAT PACKAGE)



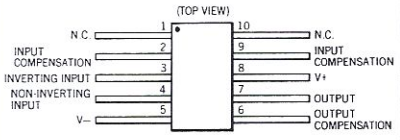
Note: All dimensions in inches

ORDER PART NO.
U3T7709313

SCHEMATIC DIAGRAM



CONNECTION DIAGRAM



Note: Pin 5 connected to case.

*Planar is a patented Fairchild process.

NOTES:

(1) Rating applies for case temperatures to +125°C; derate linearly at 2.5 mW/°C for ambient temperatures above +60°C.

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FAIRCHILD SEMICONDUCTOR
A DIVISION OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

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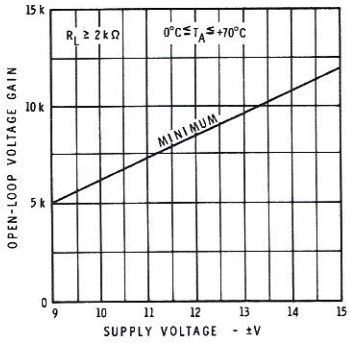
MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2981877, 3015048, 3025589, 3064167, 3108359, 3117260; OTHER PATENTS PENDING.

ELECTRICAL CHARACTERISTICS ($V_S = \pm 15$ V, $T_A = 25°C$ unless otherwise specified)

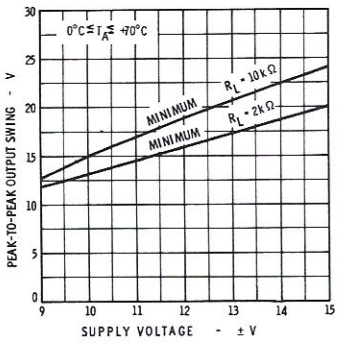
PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Offset Voltage	$R_S \leq 10$ kΩ, ± 9 V $\leq V_S \leq \pm 15$ V		2.0	7.5	mV
Input Offset Current			100	500	nA
Input Bias Current			0.3	1.5	μA
Input Resistance		50	250		kΩ
Output Resistance			150		Ω
Large-Signal Voltage Gain	$R_L \geq 2$ kΩ, $V_{out} = \pm 10$ V	15,000	45,000		
Output Voltage Swing	$R_L \geq 10$ kΩ	±12	±14		V
	$R_L \geq 2$ kΩ	±10	±13		V
Input Voltage Range		±8.0	±10		V
Common Mode Rejection Ratio	$R_S \leq 10$ kΩ	65	90		dB
Supply Voltage Rejection Ratio	$R_S \leq 10$ kΩ		25	200	μV/V
Power Consumption			80	200	mW
Transient Response	$V_{in} = 20$ mV, $R_L = 2$ kΩ,				
Risetime	$C_1 = 5000$ pF, $R_1 = 1.5$ kΩ, $C_2 = 200$ pF, $R_2 = 50$ Ω		0.3		μs
Overshoot	$C_L \leq 100$ pF		10		%
The following specifications apply for $0°C \leq T_A \leq +70°C$:					
Input Offset Voltage	$R_S \leq 10$ kΩ, ± 9 V $\leq V_S \leq \pm 15$ V			10	mV
Input Offset Current				750	nA
Input Bias Current				2.0	μA
Large-Signal Voltage Gain	$R_L \geq 2$ kΩ, $V_{out} = \pm 10$ V	12,000			
Input Resistance		35			kΩ
The following specifications apply for $-55°C \leq T_A \leq +125°C$:					
Input Offset Voltage	$R_S \leq 10$ kΩ, ± 9 V $\leq V_S \leq \pm 15$ V			12.5	mV
Input Offset Current				1.2	μA
Input Bias Current				3.0	μA
Large-Signal Voltage Gain	$R_L \geq 2$ kΩ, $V_{out} = \pm 10$ V	10,000			

GUARANTEED ELECTRICAL CHARACTERISTICS

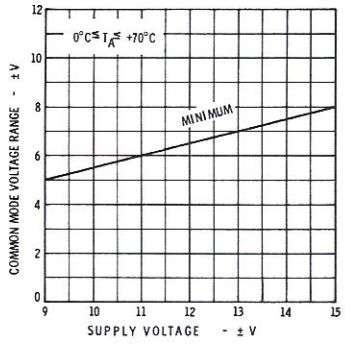
VOLTAGE GAIN



OUTPUT VOLTAGE SWING

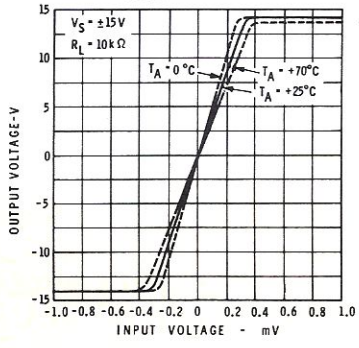


INPUT COMMON MODE VOLTAGE RANGE

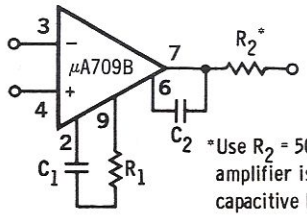


TYPICAL PERFORMANCE CURVES

VOLTAGE TRANSFER CHARACTERISTIC

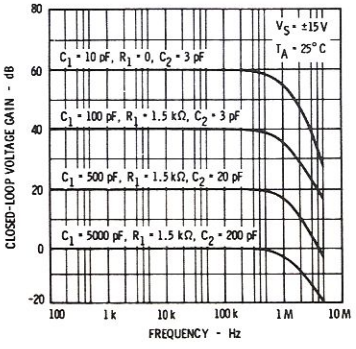


FREQUENCY COMPENSATION CIRCUIT



*Use R_2 = 50 Ω when the amplifier is operated with capacitive loading.

FREQUENCY RESPONSE FOR VARIOUS CLOSED-LOOP GAINS


80
60
40
20
0
-20
100
1 k
10 k
100 k
1 M
10 M
V_S = ±15 V
T_A = 25° C
C_1 = 10 pF, R_1 = 0, C_2 = 3 pF
C_1 = 100 pF, R_1 = 1.5 kΩ, C_2 = 3 pF
C_1 = 500 pF, R_1 = 1.5 kΩ, C_2 = 20 pF
C_1 = 5000 pF, R_1 = 1.5 kΩ, C_2 = 200 pF
CLOSED-LOOP VOLTAGE GAIN - dB
FREQUENCY - Hz

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